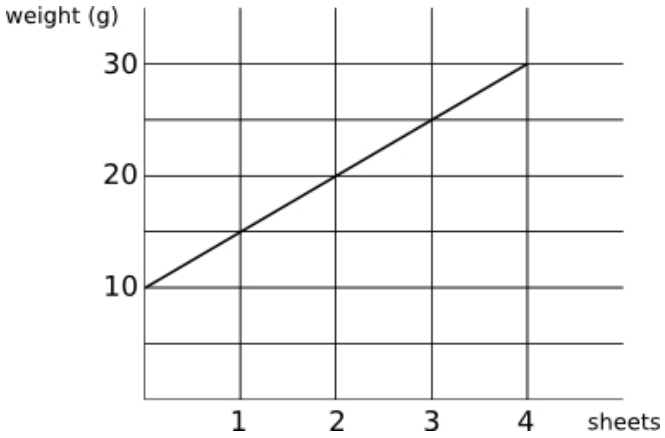
AIMSSEC

AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES
SCHOOLS ENRICHMENT CENTRE
TEACHER NETWORK

PAPER WEIGHT



The graph shows how the weight of a letter (including the envelope) varies with the number of sheets of paper used.

What is the weight of a single sheet of paper?

What is the weight of the envelope?

If w is the weight of the letter (including the envelope) and s is the number of sheets of paper, what is equation giving w as a function of s (the equation of the line)?

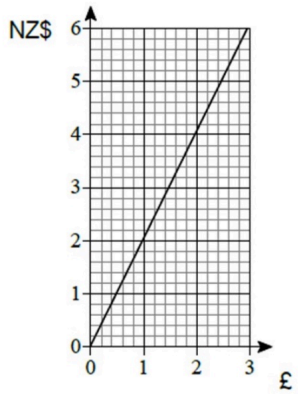
SOLUTION

The weight of a single sheet of paper is 5g because the graph shows an increase in 5g weight for each extra sheet of paper.
The weight of the envelope is 10g from the reading on the graph for 0 sheets of paper.
The equation of the line is w = 5s + 10

NOTES FOR TEACHERS

Diagnostic Assessment This should take about 5–10 minutes.

1. Write the question on the board, say to the class:
   "Put up 1 finger if you think the answer is A, 2 fingers for B, 3 fingers for C and 4 fingers for D".
2. Notice how the learners responded. Ask a learner who gave answer A to explain why he or she gave that answer and DO NOT say whether it is right or wrong but simply thank the learner for giving the answer.
3. Then do the same for answers B, C and D. Try to make sure that learners listen to these reasons and try to decide if their own answer was right or wrong.
4. **Ask the class again to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers.** It is important for learners to explain the reason for their answer otherwise many learners will just make a guess.
5. If the concept is needed for the lesson to follow, explain the right answer or give a remedial task.



This is part of a graph to change between New Zealand Dollars (NZ$) and Pounds (£).

Use the graph to help convert 50 New Zealand Dollars (NZ$) into Pounds (£).

A	B	C	D
£2.50	£25	£100	Impossible to tell

B. is the correct answer. As £3 =NZ$6
£1 = NZ$2 so NZ$50 = £25

Common Misconceptions

A. Learners may be thinking along the right lines but unable to do the calculation.

C. Learners are doubling instead of halving the amount.

D. Learners cannot read information from graphs.

https://diagnosticquestions.com

Why do this activity?

Start with the diagnostic question about currency conversion and then give the learners the following two activites to do. There should be some class discussion about the need to understand exchange rate fluctuations and the impact on trade between countries.

(1) Draw a graph to show the currency conversion between South African Rand and Botswana Pula –given that ZAR 5 = BWP 4 What is ZAR 1000 worth in pula?

(2) (2) Draw a graph to show the currency conversion between Tanzanian shillings and Ugandan shillings given that TZS 5 = UGX 8 What is UGX 1000 worth in Tanzanian shillings?

This Paper Weight activity is ideal for formative assessment on knowledge and understanding of straight line graphs. If the learners do the currency conversion graphs first they should be able to do the Paper Weight activity without help. These activities gives learners experience of applying their school maths to real life examples, taking readings from a graph and deciding on the equation of the straight line.

Intended learning outcomes

To be able

- to analyse situations in a real life context in order to make sense of them and to apply the mathematics they have learnt
- to interpret a graph and represent and describe a situation in an equation.

STUDENTS GIVING FEEDBACK

SHOWBOARDS – laminated A4 sheets of paper – blank one side – square grid other side

Possible approach

Make sure that each learner has a showboard.

Draw the graph on the board and explain that it shows the weight of a letter (including the envelope) varies with the number of sheets of paper used.

Ask the class to write their answer to the question "What is the weight of a single sheet of paper?" very large on their showboard so you can read all the answers. Tell them to raise their showboards ALL AT THE SAME TIME. Then they must erase that answer.

Ask a learner to explain how to find the answer by coming to the board and pointing to the graph to show how to take readings from the graph. If several learners had given the wrong answer on their showboards (or no answer) then get more learners to explain how to find the answer, including one learner who had not got it right initially.

Next, ask the class to write their answer to the question "What is the weight of the envelope?" on their showboard and then to raise their showboards. Again get learners to come to the board to explain this.

Then tell the class that w is the weight of the letter (including the envelope) and s is the number of sheets of paper and write these letters on the axes of the graph. Then ask them to write down the equation of the line giving w as a function of s on their showboards and raise them at the same time. Again get learners to come to the board to explain this and finally summarize what has been learned from the activity.

Key questions

What do the numbers on that axis tell you? What about the other axis?
What do the coordinates of a point on the graph tell you?
What is the gradient of the graph?
What is the w when s = 0?

Possible extension

https://aiminghigh.aimssec.ac.za/grades-7-to-9-temperature/

In some countries temperature is measured in degrees Celsius (originally called degrees Centigrade) and in other countries it is measured in degrees Fahrenheit.

The freezing point of water is 0 degrees Celsius and 32 degrees Fahrenheit.
The boiling point of water is 100 degrees Celsius and 212 degrees Fahrenheit.

Draw a graph to convert Celsius to Fahrenheit by using the above information to plot two points and joining them by a straight line.

What is the equation of this line?

Possible support

You might demonstrate this with an envelope and some paper.

Note: The Grades or School Years specified on the AIMING HIGH Website correspond to Grades 4 to 12 in South Africa and the USA, to Years 4 to 12 in the UK and up to Secondary 5 in East Africa.
Note: The mathematics taught in Year 13 (UK) and Secondary 6 (East Africa) is **not** included in the school curriculum for Grade 12 SA.

	Lower Primary or Foundation Phase Age 5 to 9	**Upper Primary Age 9 to 11**	**Lower Secondary Age 11 to 14**	**Upper Secondary Age 15+**
South Africa	**Grades R and 1 to 3**	**Grades 4 to 6**	**Grades 7 to 9**	**Grades 10 to 12**
USA	**Kindergarten and G1 to 3**	**Grades 4 to 6**	**Grades 7 to 9**	**Grades 10 to 12**
UK	**Reception and Years 1 to 3**	**Years 4 to 6**	**Years 7 to 9**	**Years 10 to 13**
East Africa	**Nursery and Primary 1 to 3**	**Primary 4 to 6**	**Secondary 1 to 3**	**Secondary 4 to 6**